

The moth's caterpillar creates a characteristic mine along the midrib of a pyracantha leaf. This eventually increases to become a large blister covering most of the leaf and eventually the leaf withers and curls forming a pod. The presence of the leaf mines is obvious, and examination of bushes often shows that 90% of leaves are affected.

The most simple model of the expansion of a species is a diffusion model, with expansion outwards of an ever increasing circle. If the spread outwards along the radius is uniform, a plot of time against the square root of the expansion area is a straight line. The data for *P. leucographella* showed an almost exact straight line. By extrapolating backwards in time to the point of zero area, a guess can be made as to the arrival of the insect, in this case 1987.

By examining the published records of other 'invading' moth species, it was possible to show parallels with, as well as differences from, the invasion of *P. leucographella*.

Many newly arrived species feed on garden plants that are widely grown, and have been able to establish themselves in Britain quite easily. One example is *Thera cupressata* Gey. Its foodplant, cypress, is a native of the Mediterranean area. The tree has been planted up the Atlantic coast of Spain and France, and the moth has followed up the Bay of Biscay and across the Channel.

P. leucographella and *P. platani* arrived into south-east England, but some, like *Paracystola acroxantha* Meyr. arrived into the south-west. *Acleris abietana* Hübn. arrived into Scotland and has since spread southwards as far as Northumberland. This species may have been an accidental importation rather than arriving here on its own steam.

Most species spread naturally once they arrive, but some, like *P. leucographella*, are likely to be moved by man, especially through the garden trade. *Cacoecimorpha pronubana* is mainly a greenhouse insect, and is spread through the movement of plants. A simple diffusion model is inappropriate to study its spread.

Study of several species showed that irrespective of body mass, expansion took place at a rate of about 5–10 km per year.

By observing the spread of *Phyllonorycter leucographella*, a relatively harmless moth species, it is hoped to gain some insights into the way potential pest species might spread, if they accidentally became established in Britain.

SHORT COMMUNICATION

Ectobius lapponicus (L.) (Dictyoptera: Blattidae) discovered in Gloucestershire.—The dusky cockroach (*Ectobius lapponicus*) was swept by myself and Dave Clements in good numbers from an area of tussocky *Deschampsia cespitosa* (L.) and rushes (*Juncus* sp.) at Foxes Bridge Marsh (SO 630125) in the Forest of Dean, W. Glos., on 17.vi.1990. The marsh is developed in a small depression in the Dean coal measures, where overlying alluvium and a stream create an acid mire—a rare habitat in the county. The site is surrounded by mature oak woodland which provides good shelter. The cockroach was present in every sweep of our nets in the drier parts of the marsh. Its discovery in the county was quite unexpected; the nearest modern sites are many kilometres away to the south, although there is an old record from Warwickshire to the north (Marshall & Haes, 1988).—K. N. A. Alexander, 22 Cecily Hill, Cirencester, Gloucestershire, GL7 2EF.

REFERENCE

Marshall, J. A. & Haes, E. C. M. 1988. *Grasshoppers and allied insects of Great Britain and Ireland*. Colchester: Harley Books.